



MSMR



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Surveillance Trends

Noncombat Gunshot Injuries Among the Active Duty Servicemembers, 1990-1999

Firearm injuries are a major threat to the health of young adult Americans. In 1994 in the United States, for example, there were 38,505 firearm-related deaths and approximately three nonfatal injuries for every death.¹ Approximately one-third of all firearm-related deaths were among persons between 15 and 24 years old,¹ the age range of approximately 40% of active duty soldiers.

Military personnel must be prepared to use firearms safely and effectively in the event of war, civil disturbance, or military conflict. In turn, initial and periodic military weapons training emphasizes marksmanship, operator skills, and safety. Officers and enlisted personnel are generally trained and qualified with handguns and M16 rifles, respectively. It is unknown, however, whether military members are more or less likely than their civilian counterparts to be injured by firearms. This report describes the nature, magnitude, distribution, and correlates of non-combat gunshot-related injury risks among active duty members of the US Armed Forces.

Methods. All data were derived from the Defense Medical Surveillance System. Standard inpatient data records were searched to identify all hospitalizations of active duty servicemembers from January 1990 through December 1999 that resulted

from noncombat gunshot wounds. This characterization was based on NATO Standardization Agreement (STANAG) external cause of injury codes 560-569.² Deaths of servicemembers hospitalized for gunshot wounds were identified from information extracted from the Report of Casualty of the Worldwide Casualty System of the Department of Defense. Department of Defense Primary Occupation Codes were used to categorize military occupations into "combat," "law enforcement," "support," and "medical" subgroups.

Results. In the 1990s, 2,365 active duty military personnel sustained noncombat gunshot injuries that resulted in hospitalizations or deaths. The crude incidence rate was 14.4 per 100,000 person-years. Ninety-seven percent of all active duty gunshot victims were males.

In general, gunshot injury rates declined steeply with age, were higher among males than females, and were higher among blacks compared to white and other servicemembers (figure 1). The highest demographic subgroup-specific gunshot injury rate was among black males younger than 25 (50.5 per 100,000 person-years); in contrast, the rate among females older than 35 was 1.4 per 100,000 person-years.

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Figure 1. Gunshot wound-related hospitalizations, by age, race, and gender, US Armed Forces, 1990-1999

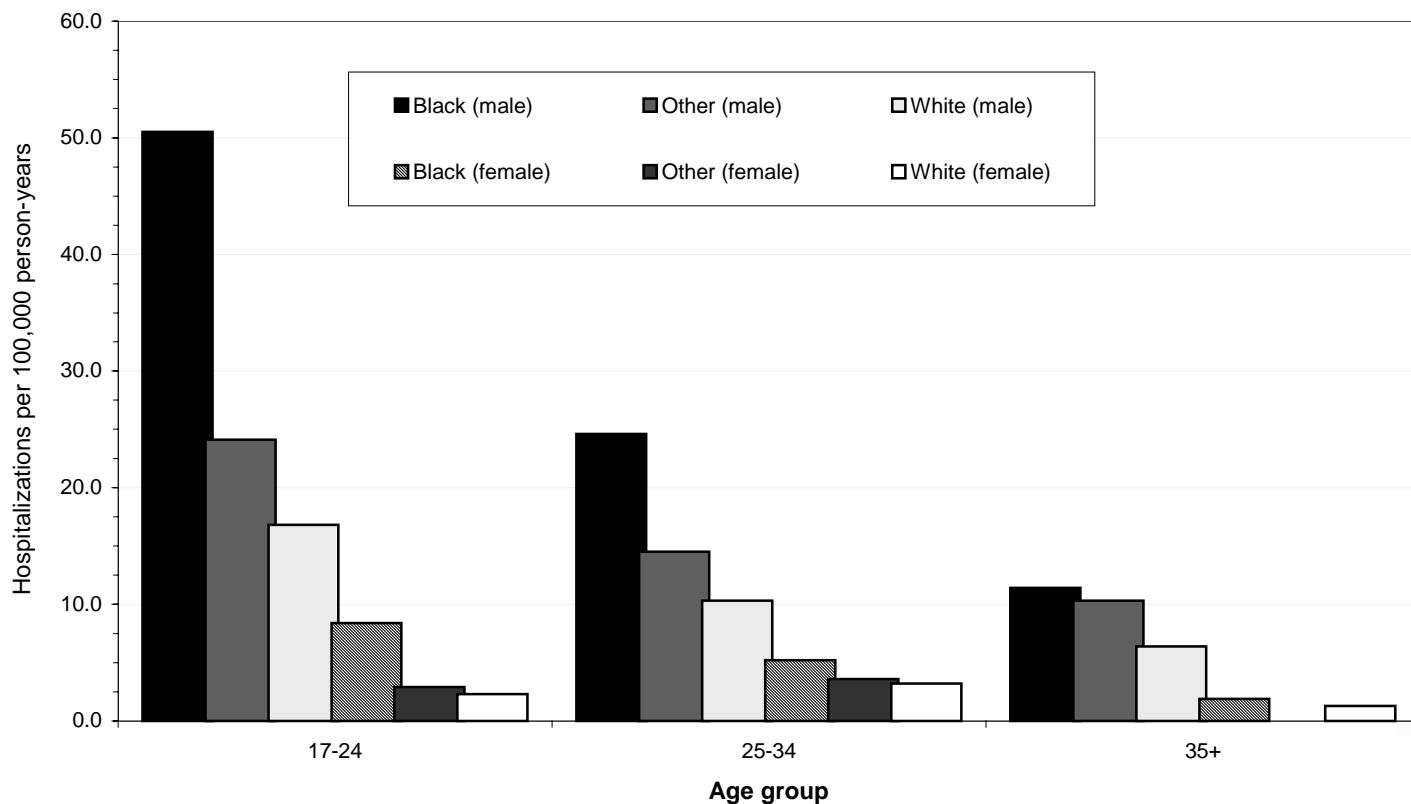
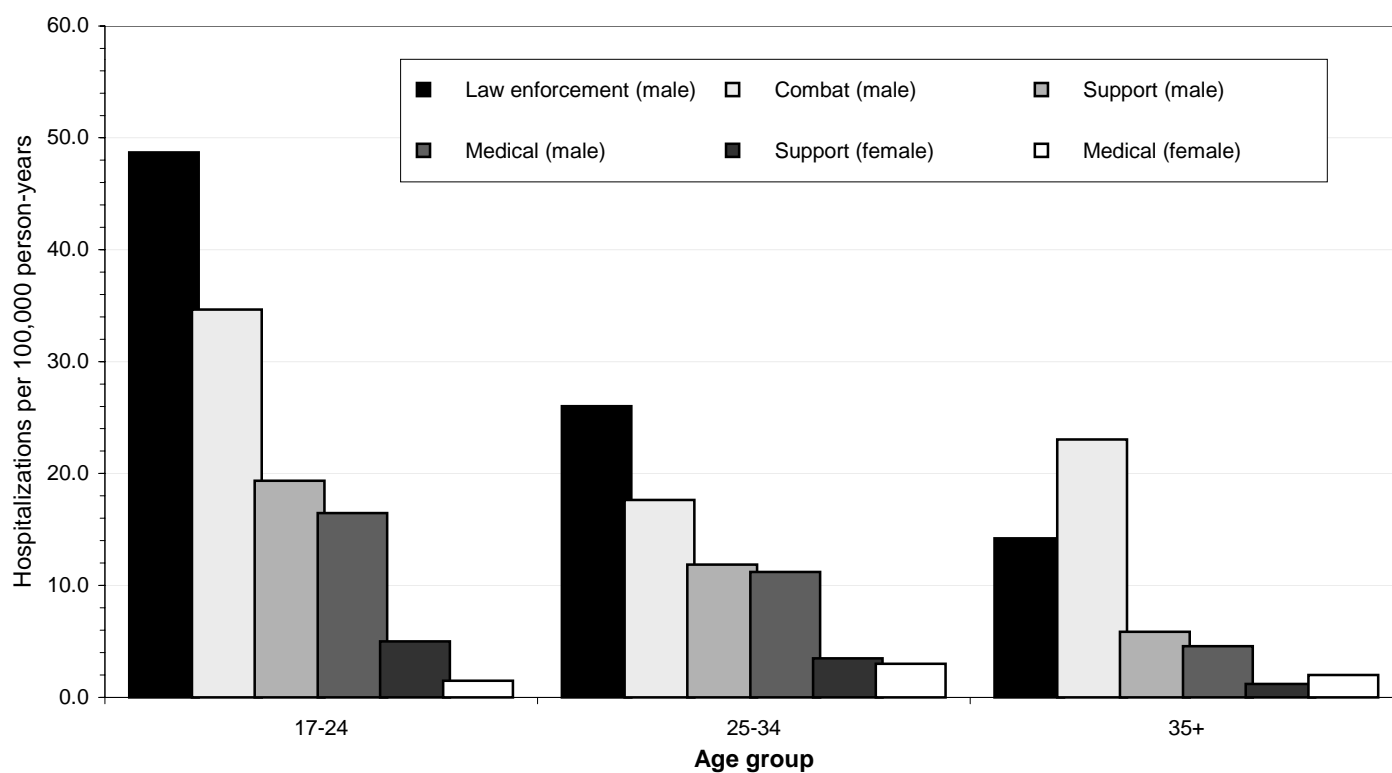


Figure 2. Gunshot wound-related hospitalizations, by occupational group,* age, and gender, US Armed Forces, 1990-1999



* Data not shown for law enforcement (female) and combat (female): 1 case each

Table I. Sentinel reportable events, US Army medical treatment facilities¹
Cumulative events for all beneficiaries, calendar year through October 31, 1999 and 2000²

Reporting Facility	Number of reported events ³		Environmental				Food- and Water-borne							
			Cold		Heat		Campylobacter		Giardia		Salmonella		Shigella	
	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000
NORTH ATLANTIC RMC														
Walter Reed AMC, DC	157	165	-	-	-	-	4	2	5	6	2	9	-	5
Aberdeen Prov. Grd., MD	24	28	-	-	-	-	-	-	-	-	-	-	-	-
FT Belvoir, VA	186	191	-	-	2	8	9	12	8	5	11	9	3	2
FT Bragg, NC	1,037	1,224	8	-	101	148	5	2	2	-	30	15	-	1
FT Drum, NY	181	147	15	9	3	1	1	-	4	-	1	-	-	-
FT Eustis, VA	182	201	1	-	3	8	2	4	-	-	4	5	1	-
FT Knox, KY	261	220	2	-	15	10	3	1	2	2	1	1	3	-
FT Lee, VA	144	230	-	-	1	1	-	-	-	-	1	-	-	-
FT Meade, MD	52	89	-	-	-	-	-	-	-	-	-	2	-	-
West Point, NY	57	92	-	1	2	1	-	-	-	-	-	3	1	-
GREAT PLAINS RMC														
Brooke AMC, TX	364	260	-	-	9	4	-	3	-	5	7	4	4	5
Beaumont AMC, TX	243	275	-	-	5	6	-	-	-	2	4	7	-	6
FT Carson, CO	643	535	2	-	-	-	5	1	10	4	6	2	1	8
FT Hood, TX	1,205	1,597	-	1	8	32	2	3	1	1	8	9	8	4
FT Huachuca, AZ	43	23	-	-	2	1	1	-	-	-	1	-	1	-
FT Leavenworth, KS	17	27	-	-	-	2	2	1	1	2	-	1	-	-
FT Leonard Wood, MO	142	152	3	4	3	11	-	1	1	1	2	-	-	-
FT Polk, LA	195	248	-	-	1	4	-	-	-	-	-	-	-	-
FT Riley, KS	219	157	1	22	11	1	-	-	-	-	-	-	-	-
FT Sill, OK	257	251	-	-	9	8	-	-	-	-	-	-	1	-
SOUTHEAST RMC														
Eisenhower AMC, GA	181	255	1	-	4	1	-	-	-	-	2	2	-	1
FT Benning, GA	349	322	-	-	100	51	1	1	2	3	14	16	2	1
FT Campbell, KY	277	357	2	2	10	3	7	3	1	5	2	16	10	12
FT Jackson, SC	381	347	-	-	-	1	-	-	-	-	1	-	-	-
FT Rucker, AL	48	69	-	-	4	1	-	-	-	-	-	3	1	-
FT Stewart, GA	283	480	-	-	3	27	-	-	-	-	2	6	-	-
WESTERN RMC														
Madigan AMC, WA	402	629	-	-	-	-	-	5	1	5	-	6	1	2
FT Irwin, CA	38	47	-	-	-	-	-	-	-	-	-	-	-	-
FT Wainwright, AK	115	83	42	4	-	-	-	-	-	-	-	-	-	-
OTHER LOCATIONS														
Tripler, HI	467	696	-	-	1	3	22	36	12	8	11	10	1	1
Europe	570	1,434	3	5	-	-	18	16	-	2	13	24	3	2
Korea	377	458	8	2	5	5	-	-	-	-	-	7	-	-
Total	9,097	11,289	88	50	302	338	82	91	50	51	123	157	41	50

1. Main and satellite clinics.

2. Events reported by November 7, 1999 and 2000.

3. Total includes all Tri-Service Reportable Events. Some Reportable Events are not displayed in this table.

Table I. (Cont'd) Sentinel reportable events, US Army medical treatment facilities¹
Cumulative events for all beneficiaries, calendar year through October 31, 1999 and 2000

Arthropod-borne				Vaccine Preventable						Sexually Transmitted							
Lyme Disease		Malaria		Hepatitis A		Hepatitis B		Varicella		Chlamydia		Gonorrhea		Syphilis ⁴		Urethritis ⁵	
Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000	Cum. 1999	Cum. 2000
1	3	4	-	1	1	-	1	3	3	79	56	16	23	3	1	1	-
-	3	-	-	-	-	-	2	1	1	8	11	13	3	-	2	2	2
-	-	-	-	1	-	-	3	-	1	117	113	32	23	-	3	-	-
4	2	3	6	-	-	-	-	1	5	470	477	213	233	2	3	194	326
-	-	3	1	-	-	-	-	6	5	97	94	45	34	-	-	3	2
-	1	1	-	-	-	1	1	1	1	124	145	41	32	-	-	-	-
-	-	-	-	-	-	-	1	1	6	176	156	54	40	1	1	-	-
-	-	-	-	-	1	1	-	-	-	114	178	24	50	3	-	-	-
2	-	-	-	-	-	-	-	1	-	42	65	5	11	-	1	-	2
15	33	-	-	-	-	2	1	1	2	30	36	3	10	-	1	-	-
2	-	2	2	3	-	4	-	2	2	161	140	48	52	-	2	1	-
-	-	1	-	1	3	-	-	2	1	196	202	18	35	-	-	11	6
-	-	-	1	-	-	1	-	1	-	460	420	82	57	-	-	67	36
1	-	4	1	1	1	1	1	3	2	701	863	193	309	4	1	234	347
-	-	-	-	1	-	-	-	-	-	31	16	4	6	-	-	-	-
-	1	-	-	-	-	-	-	-	-	11	16	3	2	-	-	-	-
-	1	1	-	-	-	1	-	10	13	82	78	22	29	1	-	8	8
-	-	1	-	-	-	-	-	-	-	154	214	35	30	2	-	-	-
-	-	-	-	-	-	-	-	-	-	152	88	55	42	-	1	-	-
-	2	1	-	-	-	6	-	6	4	139	140	55	47	2	-	30	39
-	2	-	3	1	-	3	3	2	2	144	187	13	16	1	-	-	-
-	-	1	8	1	-	-	1	1	8	113	135	81	91	1	3	-	-
-	1	5	8	-	-	-	1	-	2	149	175	91	121	-	1	-	-
-	-	-	-	-	-	-	-	6	3	312	304	48	37	6	-	-	-
-	-	-	1	-	-	-	-	-	-	32	44	11	14	-	-	-	-
-	-	4	1	-	-	-	-	4	-	92	163	56	104	-	-	120	176
-	3	5	7	-	1	-	2	-	-	237	413	47	54	-	-	101	108
-	-	-	1	-	-	5	-	-	1	29	37	4	7	-	1	-	-
-	-	1	-	-	-	1	-	2	-	58	76	9	2	-	-	-	-
-	-	4	3	-	1	1	2	-	1	291	485	72	83	-	-	-	1
7	15	2	-	2	1	6	7	4	9	396	1,102	101	231	-	2	1	-
-	-	16	13	-	-	14	1	3	2	281	356	11	37	15	12	-	11
32	67	59	56	12	9	47	27	61	74	5,478	6,985	1,505	1,865	41	35	773	1,064

4. Primary and secondary.

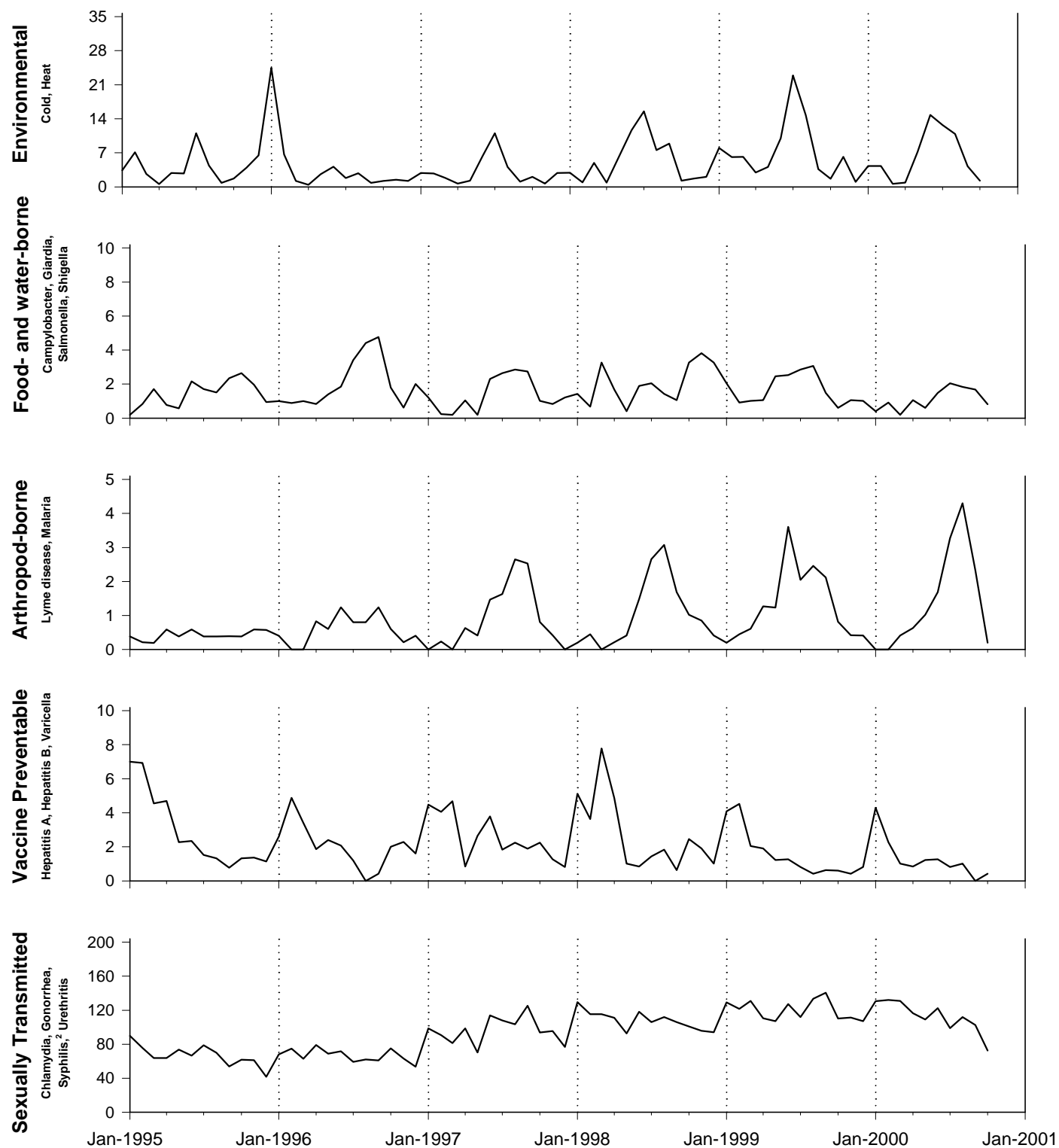
5. Urethritis, non-gonococcal (NGU).

Note: Completeness and timeliness of reporting varies by facility.

Source: Army Reportable Medical Events System.

Figure I. Sentinel reportable events (grouped), active duty soldiers, January 1995 - November 2000¹

Cases / 10,000 person-years



1. Events reported by November 7, 2000.

2. Primary and secondary.

Table 1. Noncombat gunshot wound hospitalizations, by military service, marital status, age, and gender, 1990-1999

Characteristic	Men						Women					
	17-24		25-34		35+		17-24		25-34		35+	
	N	Rate*	N	Rate*	N	Rate*	N	Rate*	N	Rate*	N	Rate*
Total	1300	23.3	750	13.5	244	7.6	35	4.1	31	3.9	5	1.4
Service												
Army	704	36.5	465	24.1	149	14.0	21	6.8	18	6.0	2	1.6
Navy	289	17.6	137	8.6	21	2.3	4	1.7	4	2.0	1	1.1
Air Force	117	11.8	104	6.6	68	6.5	6	2.3	9	3.3	2	1.5
Marines	190	18.7	44	9.2	6	2.8	4	7.6	0	0.0	0	0.0
Grade												
Officer	9	5.0	48	4.8	30	2.9	1	2.8	2	1.3	0	0.0
Enlisted	1291	23.9	733	16.0	219	10.0	34	4.2	29	4.5	6	2.5
Marital Status												
Single	918	23.1	203	17.0	10	4.7	17	3.0	5	2.0	1	1.2
Married	375	24.1	510	12.3	206	7.3	18	6.7	24	5.2	3	1.3
Other	7	18.4	37	17.6	28	18.8	0	0.0	2	2.6	1	1.7

*Rates are per 100,000 person-years.

In general, gunshot injury rates were highest in the “law enforcement” and lowest in the “medical” occupational groups (figure 2, page 3). The highest age, gender, and occupation-specific rate (48.7 per 100,000 person-years) was among 17-24 year old males in law enforcement.

The rate of gunshot-related hospitalizations among soldiers was nearly two-times higher than among sailors and marines and three-times higher than among Air Force personnel (table 1). In each age- and gender-defined subgroup, the rate was higher among enlisted members than among officers.

Males were much more likely than females, and black servicemembers were more likely than “other” and white servicemembers, to be victims of both fatal and nonfatal gunshots (table 2, page 8). However, while there was a strong relationship between age and rates of non-fatal gunshot injuries, there was relatively little variation with age in rates of fatal injuries.

The settings where gunshot injuries occurred were not specified in 70% of cases; however, the most commonly reported locations of shootings were the “home, quarters, or barracks” (nonfatal injuries: 344, deaths: 179) and the “firing range or drill field” (nonfatal injuries: 110, deaths: 16).

Of nonfatal gunshot injuries, nearly three-fourths (72.4%) were considered “unintentional,” approximately one-fifth (20.5%) were from “as-

saults,” and 6.7% were “self-inflicted” (table 3, page 8). Hospitalizations of gunshot victims ranged from 1 to 1,057 days, and the average hospital stay was 16 days. Surgical procedures were performed during approximately one-fourth (24%) of gunshot-related hospitalizations. Three percent of survivors were rehospitalized due to their injuries, 66% required outpatient physical therapy (data from 1998 and 1999 only), and 37% were discharged from military service within a year of their hospitalizations.

Finally, 446 servicemembers died (case fatality rate: 18.9%) from gunshot injuries. In contrast to nonfatal cases, nearly half (49.6%) of fatal gunshots were “suicides,” approximately one-sixth (15.5%) were “homicides,” and one-third (35.0%) were “unintentional.”

Editorial comment. Firearms, particularly handguns, are the focus of significant public health and political interest in the United States.³⁻⁷ Young black males in large cities are particularly overrepresented among victims of handgun violence.³⁻⁵ Urbanization,^{3,4} socioeconomic structures,³⁻⁵ and illicit drug marketing (particularly crack cocaine)³ have all been implicated as underlying factors. The experience of the US Armed Forces regarding gun-related injuries may be informative since servicemembers are carefully screened prior to entering service (e.g., criminal records, illicit drug use), are fully employed

Table 2. Noncombat gunshot-related injuries, by gender, race, and age, US Armed Forces, 1990-1999

Characteristic	Nonfatal hospitalizations				Deaths				Total			
	N	%	Rate*	Relative rate	N	%	Rate*	Relative rate	N	%	Rate*	Relative rate
Gender												
Male	1873	97.6	13.04	5.71	421	94.4	2.93	2.36	2294	97.0	15.97	4.53
Female	46	2.4	2.28	1.00	25	5.6	1.24	1.00	71	3.0	3.52	1.00
Race												
Black	737	38.4	27.52	2.82	139	31.2	5.19	2.08	876	37.0	32.71	2.67
Other	149	7.8	13.51	1.38	43	9.6	3.90	1.56	192	8.1	17.41	1.42
White	1033	53.8	9.76	1.00	264	59.2	2.49	1.00	1297	54.8	12.25	1.00
Age												
17-24	1148	59.8	17.85	4.09	187	41.9	2.91	1.12	1335	56.4	20.75	2.98
25-34	615	32.0	9.65	2.21	166	37.2	2.61	1.00	781	33.0	12.26	1.76
> 35	156	8.1	4.36	1.00	93	20.9	2.60	1.00	249	10.5	6.96	1.00

*Rates are per 100,000 person-years

Table 3. Noncombat gunshot-related injuries, by reported intention, US Armed Forces, 1990-1999

Intent	Nonfatal hospitalizations				Deaths				Total			
	N	%	Rate*	Relative rate	N	%	Rate*	Relative rate	N	%	Rate*	Relative rate
Unintentional	1390	72.4	8.49	10.78	156	35.0	0.95	0.71	1546	65.4	9.44	4.42
Assault/homicide	394	20.5	2.41	3.05	65	14.6	0.40	0.29	459	19.4	2.80	1.31
Self-inflicted/suicide	129	6.7	0.79	1.00	221	49.6	1.35	1.00	350	14.8	2.14	1.00
Legal intervention	6	0.3	0.04	0.05	4	0.9	0.02	0.02	10	0.4	0.06	0.03
Total	1919	100.0	11.71	--	446	100.0	2.72	--	2365	100.0	14.44	--

*Rates are per 100,000 person-years.

while on active duty, generally reside on or near military installations (which are usually not near large urban areas), are periodically screened for illicit drug use, and have access to and familiarity and experience with firearms.

Still, in the US Armed Forces, as in the country overall, rates of gunshot injuries were highest among young Black males. Of note, a study of homicides (63% from gunshots) in the US Armed Forces found that Black servicemembers were more than twice as likely to be homicide victims as their White counterparts.⁸

In the US Armed Forces in the 1990s, the overall rate of gunshot injuries (14.4 per 100,000 person-years) and the case fatality rate (18.9%) were lower than the corresponding rates in states with dedicated surveillance systems. For example,

in Oklahoma in 1998, the incidence rate of firearm-related injuries was 45.5 per 100,000 population, and the case fatality rate was 35%.⁹ For the years 1989 through 1995, Washington state reported a firearm injury rate of 28 per 100,000 person-years, and a case fatality rate of 42%.¹⁰ The Centers for Disease Control and Prevention have estimated that the case fatality rate nationally is approximately 33%.^{6,7} Unfortunately, direct comparisons of military and nonmilitary gunshot-related injury experiences are potentially misleading. For example, military members are not comparable to nonmilitary populations in relation to firearm knowledge and experience, age, gender, access to medical care, or underlying health status.

This study has several important limitations. For example, gunshot-related injuries that did not

require hospitalizations were not systematically documented during the study period. In addition, the geographic locations, settings, and types of firearms (e.g., handgun or rifle, military or privately owned) associated with the injuries were not ascertainable.

Report and analysis by Robert Allen Frommelt, MS, Data Analysis Group, AMSA.

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Surveillance Trends

Monthly and Installation-specific Rates of Pneumonia and Influenza Diagnoses, US Army, July 1998-June 2000

Influenza is an acute febrile illness caused by infection of the respiratory tract with influenza virus. It has extreme military and public health significance because it is efficiently transmitted, often debilitating, and potentially lethal. It is estimated that each year in the United States influenza and its complications account for millions of temporarily debilitating illnesses, more than 100,000 hospitalizations, and more than 20,000 deaths.¹ In military units, outbreaks of influenza can cripple operational effectiveness.²

The predominant circulating strains of influenza differ from year to year. Since infections with influenza do not confer immunity against antigenically dissimilar strains, most members of the US population are immunologically susceptible to the "flu" strains that circulate each year.³ Therefore, surveillance of influenza strains is conducted around the world to enable predictions of the antigenic characteristics of predominant strains from year to year.⁴ These predictions are used to manufacture vaccines against anticipated predominant strains. In the US, persons at highest risk of complications of influenza are encouraged to be immunized each year. In addition, to protect the health and operational readiness of US military forces, US servicemembers are immunized against influenza at the beginning of basic training and in the fall of each year. This season, the immunization of all US servicemembers was delayed because of lags in vaccine production.

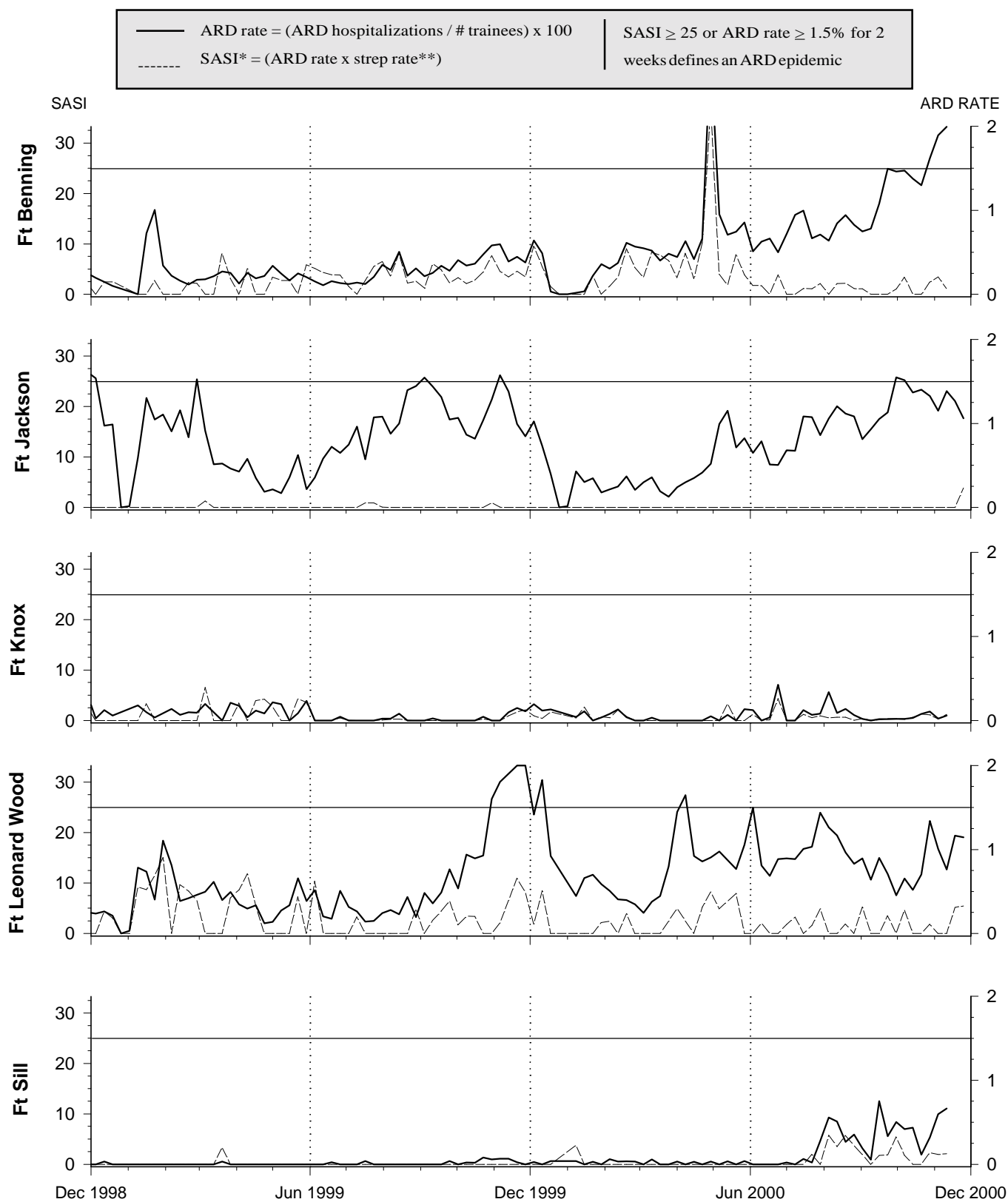
There are strong epidemiologic, immunologic, and clinical relationships between influenza and pneumonia.⁵⁻⁹ These relationships have often been exploited for purposes of monitoring influenza activity and assessing its impacts in defined populations.¹⁰⁻¹³ For more than 30 years, surveillance of acute febrile respiratory diseases in the US Army has focused on trainee populations at initial entry training centers.¹⁴ For this report, we describe distri-

butions (and month-to-month variations) in installation-specific rates of pneumonia and influenza diagnoses among active duty soldiers. The results may be useful to military public health officials to improve the monitoring and assessment of pneumonia and influenza activity at their installations.

Methods. All data were derived from the Defense Medical Surveillance System. The surveillance period was July 1998 to June 2000. Endpoints for analyses were hospitalizations and ambulatory visits of active duty soldiers during the surveillance period with diagnoses of "pneumonia and influenza" (codes 480-487, International Classification of Diseases, 9th revision, clinical modifications). For analysis purposes, all active service in the Army during the surveillance period was apportioned among 30 Army installations, Europe, Korea, and "other." For each month of the period, 33 installation-specific rates were calculated by dividing the number of pneumonia and influenza diagnoses among soldiers assigned to each installation by the estimated person-years of service during the month at the respective installation. To assess general seasonal variations, median and quartile values of installation-specific rates were calculated for each calendar month. To that end, the data from the 24-month surveillance period were sorted by calendar month (i.e., two sets of installation-specific rates were available for each of the 12 calendar months).

Results. Installation-specific pneumonia and influenza rates had the expected geographic and seasonal variabilities (figure 1, page 12). During each month of the surveillance period, the mean of the installation-specific rates exceeded the median of the rates. In addition, the mean of the monthly rates was much more volatile than the median. The median of the monthly rates varied seasonally but

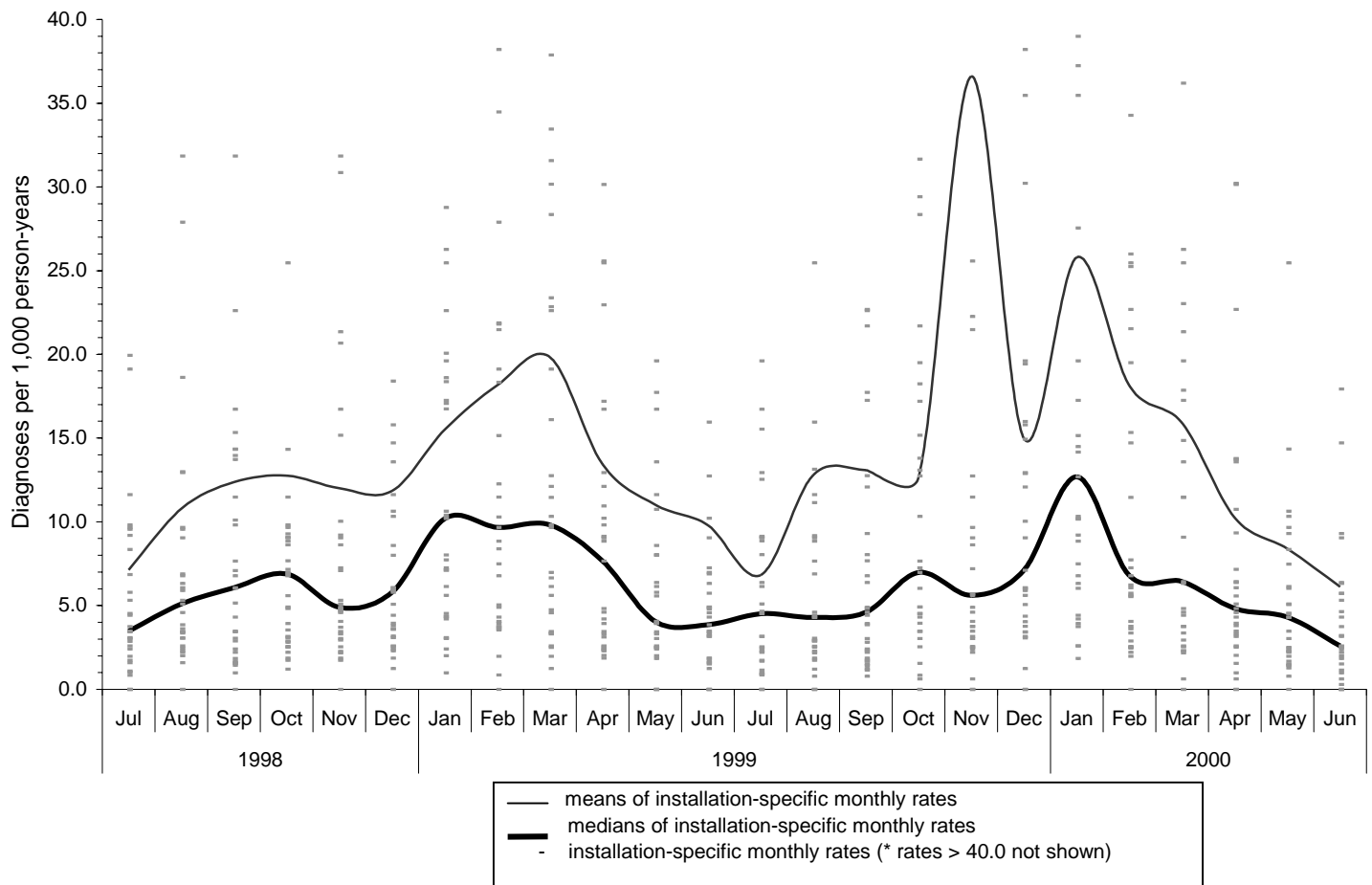
**Figure II. Acute respiratory disease (ARD) surveillance update
US Army initial entry training centers**



* SASI (Strep ARD Surveillance Index) is a reliable predictor of serious strep-related morbidity

** Strep rate = (Group A beta-hemolytic strep(+) / # cultures) x 100

Figure 1. Pneumonia and influenza diagnosis rates among active duty servicemembers, by major Army installations, by month, July 1998 - June 2000



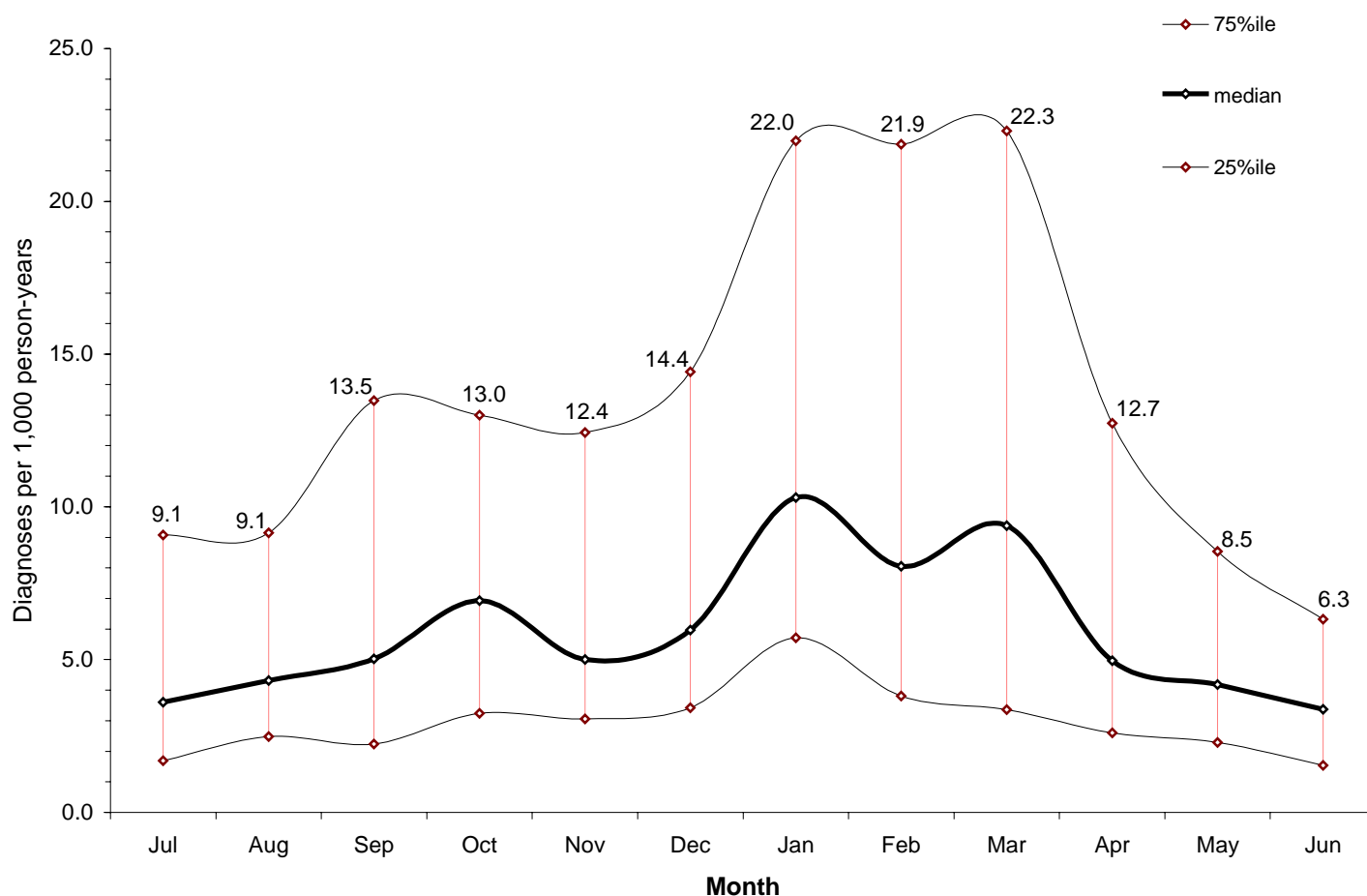
with relatively low amplitude. The lowest monthly median rate was 3.9 per 1,000 person-years in June 1999, while the highest monthly median rate was 12.7 per 1,000 person-years in January 2000. In contrast, the lowest monthly mean rate was 6.1 per 1,000 person-years in June 2000 while the highest monthly mean rate was 36.6 per 1,000 person-years in November 1999. The spike in the mean rate in November 1999 was attributable to an unusually large number of cases at one installation.

Figure 2 shows median and quartile values of installation-specific rates by calendar month (e.g., since the surveillance period was 24 months, the median and quartile values for each month were based on two sets of installation-specific rates each).

The monthly 75th percentile (%ile) rates (i.e., one-fourth of installation-specific rates were higher) reflected distinct seasonal but relatively low month-to-month variability. The monthly 75th percentile rate was clearly highest in the winter (January-March), lowest in the late spring and summer (May-August), and intermediate in the early spring and fall.

Editorial comment: As expected, there was significant variability in pneumonia and influenza rates across Army installations and seasons. Since pneumonia and influenza are closely linked epidemiologically, the rate of pneumonia and influenza diagnoses among active duty soldiers may be a useful parameter for installation-specific

Figure 2. Seasonal variability in installation-specific rates of pneumonia and influenza diagnoses, active duty soldiers, US Army, July 1998-June 2000



surveillance. Unfortunately, since installations (other than basic training posts) have not routinely monitored respiratory disease activity in the past, there are no historical or contemporaneous referents for assessing installation-specific pneumonia and influenza rates.

The monthly 75%ile of Armywide installation-specific rates seems to be sensitive to seasonal variations in pneumonia and influenza activity—but also resistant to perturbations based on isolated extreme values. Thus, the month-specific 75%ile rate may be a useful referent for installation public health officials for monitoring the pneumonia and influenza activity at their posts. Specifically, if an installation has a pneumonia and influenza diagnosis

rate that exceeds the Armywide 75%ile rate for that calendar month, then the pneumonia and influenza activity at that installation is higher than the activity at three-fourths of all Army installations during the same month of the prior two years.

Analysis conducted by Abigail Garvey Wilson, MPH, Data Analysis Group, AMSA.

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